Bio-Gas Plant Project for Waste Management and Energy Generation

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Abstract:

UB faces food wastage issues, with a huge amount of food being wasted at various dinning locations on campus. The proposal is to set-up a Bio-Gas plant, which will utilize this waste and generate electrical power, that can be used by the university. The plant will be located close to the Bridgeport landfill and solar plant. The plant can be fed with waste generated from nearby hotels and educational institutions.

Primary Objective:

To install a Bio-Gas based Waste Management System for UB, that will help generate sustainable energy in the form of heat and electricity, by recycling the bio-waste produced at university dining locations and other common areas.

Secondary Objective:

- *Energy Component:* Supply of Electricity from Biogas Engine + Thermal Energy through recovery of Biogas engine waste heat.
- *Agricultural Component:* Supply of Organic Fertilizer, establishment to feed lots for bovine animals (through ensilaging of forage crops & agricultural residues), aid farmers undertake cultivation of organic vegetables (through supplying organic fertilizer and establishing cold chain infrastructure).

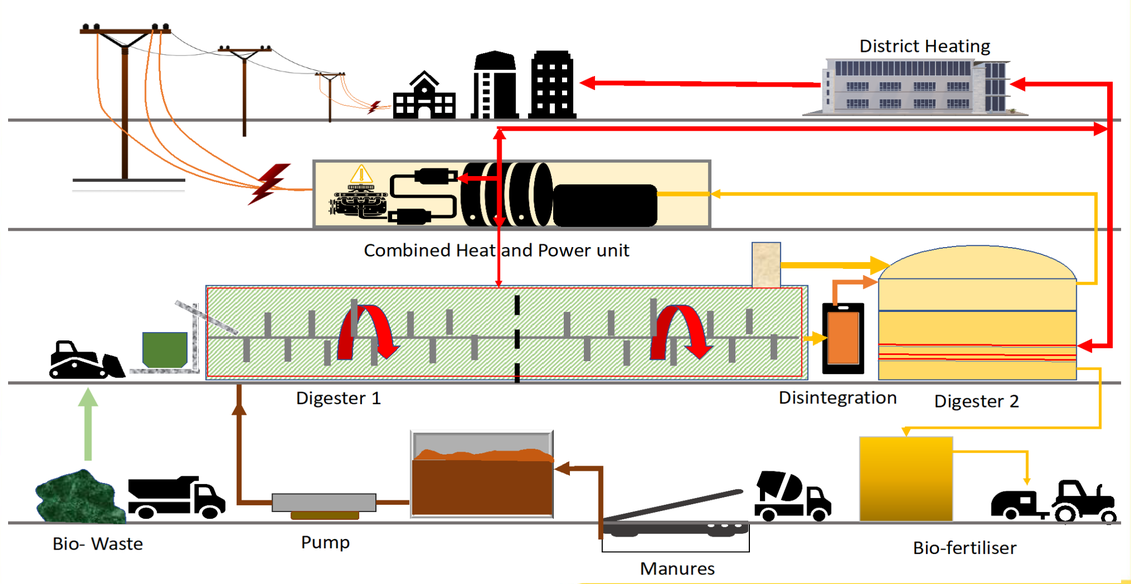

Figure 1: Process Flow

Implementation Phases:

Phase I: Ground levelling and Procurement of civil engineering supplies. Assigning job responsibilities, Setting up temporary storage spaces and on-site offices and control room. Budget Estimation: 20%.

Phase II: Installation of silo-bases, Grinders and Digester Set. Erecting silos with its. weight management mechanisms, and associated plumbing for inlet and outlet of waste materials and slurry. Budget Estimation: 30%.

Phase III: Distribution of Heat and Electricity. Installing the CHP unit and laying connections to District Heat Unit. Installing emergency safety units in case of electricity breach and plumbing leakage. Budget Estimation: 35%.

Phase IV: Final system feedback analysis and final documentation Budget Estimation: 15%.

Factors Considered for the project:

- Location: Easy connectivity.
- Man-power- Skilled and Unskilled labor.
- Resources- Engineering Equipment companies

Inputs to the Bio-Gas Digester:

- Bio-waste from University Dining locations.
- Recyclable waste from the university trash.
- Collecting dry leaves throughout the university and nearby areas during Fall and Winter seasons.
- Collecting water from the drainage pipes of the University and processing it before its injection into the digester.

Sources of Funding:

- Buy-ins from key stakeholders.
- Investments from the university.
- Funding from the State of Connecticut.

Approximate Budget:

$80,000 to $100,000

Figure 2: Risk Mitigation Plan

Type	Risk	Responsible Party	Risk Probability	Impact	Mitigation Plan
Human	Injury	Project Team	Low	High	Contractor should provide substitute
Human	Illness	Individual	Low	High	Contractor should provide substitute
Operational	Disrupt Supplies	Thirds Party Suppliers	Low	High	Substitutes and Stocking
Operational	Failure in Distribution	Thirds Party Suppliers	Low	Medium	Inventory Management
Reputational	Negativity among Citizen	Project Team	Low	High	Town Halls, Citizen education
Procedural	Process failure	Operations	Medium	Low	Task Assigning, Training
Procedural	Controls	Thirds Party Suppliers	Low	High	Automatic Shut-off switches
Procedural	Internal System	Labor and Third Parties	Low	Medium	Quality Inspection
Project	Extra Time	All Stakeholders	Medium	Medium	Extra Working Hours and more hands
Project	Over Budget	NA	Low	High	Insurance, CSR's, Public shares
Financial	No- Funding	NA	Low	High	Insurance, CSR's, Public shares
Technical	High Pressure Heat	Plumbing and Operations	Medium	High	Pressure release devices
Technical	Technical failure	Thirds Party Suppliers	Low	High	Emergency Services
Natural	Weather	ACT of GOD	Medium	Medium	Emergency Contingency Plan
Natural	Natural Disasters	ACT of GOD	Low	Medium	Emergency Contingency Plan
Structural	Bad Construction	Labors and Contractors	Low	High	Timely Quality Inspection
Structural	Fire	Labors and Operations	High	High	Critical component segregation, Fire Equipment
Structural	Accidents	Contractor and Operations	High	High	Safety Procedures
Labor	Personnel Issues	Labor and Contractor	Low	Low	Human resources

***References*:**

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QR Code:

MS Project Link for Scheduling, Gantt Chart and Network Diagram:

BioGas Plant Project _Team4.mpp